AREAS FOR GUIDANCE

In the sections below, the staff presents four areas in which Commission guidance is sought.

GUIDANCE AREA 1: Retention of Mitigation Capability

The staff seeks Commission guidance on whether appropriate beyond design basis accident mitigation capability must be retained in regulatory requirements for loss-of-coolant accidents (LOCA) larger than the new maximum design basis LOCA up to the double-ended guillotine (DEG) break size, so that a LOCA greater than the new maximum design basis is not expected to result in reactor vessel failure and early containment failure.

With removal of certain break sizes from the licensing basis, whereby these events are no longer required to be mitigated in the way they once were, the question arises about what degree of mitigation should be retained for LOCAs between the new maximum design basis LOCA break size and the largest DEG break size and how this should be required. As discussed in Attachment 3, success criteria for mitigating LOCAs, which would be larger than the new maximum break size could include criteria such as limits on fuel, reactor coolant pressure boundary or containment performance. If no mitigation capability were retained, then plant changes under a broad scope rule (e.g., large power uprates, modified core peaking profiles, structures, systems, and components (SSC) modifications) might create situations where a LOCA beyond the new maximum LOCA break size up to the DEG break could lead to core melt and potential vessel failure, resulting in a large early release and prompt early fatalities, even if all emergency core cooling system (ECCS) equipment in the plant worked as designed. While the staff believes that mitigative capability should be maintained, the staff also believes the capability should be less than presently required for design basis accidents with respect to requirements for redundancy, SSC qualification, and analysis methods.

In addition, the Commission suggested that it might be useful to place guidance on acceptability of mitigation capability for breaks between the new maximum design basis LOCA and the DEG break into the severe accident management guidelines (SAMGs) at plants. There will be large uncertainties in the estimated frequency of the breaks removed from the design basis. It should be noted that the SAMGs are entirely voluntary on a licensee's part, and may be removed by a licensee without NRC approval. The SAMGs focus largely (but not exclusively) on post-core damage actions including operator recovery actions. The staff believes it may be more appropriate that the mitigative guidelines result in plant system capability such that vessel failure and large early release are not expected for LOCAs greater than the new maximum design basis LOCA break size (as further discussed in Technical Issue Area 4 in Attachment 3).

The staff therefore asks, does the Commission agree that primary mitigative capability for beyond design basis LOCA should be retained through regulatory requirements, rather than reliance on SAMGs that are voluntary programs, often directed to post core damage actions?

GUIDANCE AREA 2: Reversibility

The staff seeks Commission guidance on two aspects related to "reversibility": (1) whether the "reversibility" concept applies if something other than LOCA frequency changes in a manner that the core damage frequency (CDF) and large early release frequency (LERF) differential or cumulative limits were exceeded, and (2) whether backfit analyses should be performed if reversibility is exercised.

The staff requirements memorandum (SRM) states that operational changes should be reversible if the (10 year) re-estimation of LOCA frequencies results in unacceptable LOCA frequency increases. Other changes could lead to increases in risk from large break (LB) LOCAs, for example, equipment reliability might decrease, new transient initiators may occur or probabilistic risk assessment (PRA) models and assumptions could change.

The staff notes that for reversibility resulting from "unacceptable increases" in LOCA frequency, under a redefinition rule, it may be necessary to restore certain break sizes to the design basis, with resultant needs for analysis and requirements at that point to show compliance with §50.46. Such restorations to the design basis, with these consequent actions necessary for compliance with §50.46, would not constitute "backfitting" as defined in the Backfit Rule, 10 CFR 50.109.

Notwithstanding the staff's determination that such restoration would not constitute backfitting, the staff seeks clarification whether the Commission believes as a matter of policy that the provisions of the Backfit Rule should be complied with before requiring such restorations and reanalyses. A policy decision in favor of requiring that backfit analyses be performed will likely necessitate changes to the Backfit Rule, as well as a specific provision in the redefinition rule. Implementation issues such as whether to require a plant shutdown would also need to be addressed.

1. The staff asks whether the plant, under such circumstances, would have to exercise "reversibility" and bring the total CDF, LERF, or delta risk values back within the original rule acceptance criteria (either by undoing a change or through other actions)? Monitoring and reversibility are necessary components for a broad scope rule, but could be more limited for a narrower-scope rule (see also discussion of cumulative effects in Attachment 3).

2. The staff recommends that backfit analyses should *not* be required where restorations to the design basis and other actions are necessary because the licensee is unable to maintain compliance with the relevant LBLOCA criteria in the proposed rule as the result of changes in plant design and operating characteristics (or new information such as revised frequency estimates).

GUIDANCE AREA 3: Use of Best-Estimate Evaluation Models

The staff seeks Commission policy guidance on the issue of use of best-estimate codes. In particular, we seek this clarification for breaks remaining within the design basis.

The SRM stated, "licensees who seek the benefit of the changes that redefine the design basis large break LOCA requirements should be required to use best-estimate codes. The staff should include such a modification in the proposed 10 CFR 50.46 rulemaking." These statements appear under a heading of ECCS evaluation model, with other comments about Appendix K. The approach laid out in §50.46(a)(1)(i) is sometimes referred to as "best-estimate," although the staff believes "realistic" is a better representation. Thus, the staff has interpreted this statement to mean that the Commission intends use of a model consistent with §50.46(a)(1)(i). The staff further notes the SRM also states that §50.46 should be modified to require that future applicants for design certification or for future construction should use best-estimate codes for LOCA analyses.

Stakeholders have expressed concern as to whether the SRM direction would require them to use such "best-estimate" ECCS models for all break sizes remaining within the design basis, as a condition for being able to use the risk-informed alternative break size. Approved §50.46 (a)(1)(i) evaluation models do not currently exist for the full spectrum of break sizes (in particular small breaks) or for all vendors. The NRC staff has not reviewed or approved any §50.46(a)(1)(i) realistic small break LOCA evaluation models for the current fleet of BWR or PWR nuclear power plants. Development and review of such models would require both industry resources and NRC resources, which currently are not budgeted. The staff recognizes that 10 CFR 50, Appendix K evaluation models are more conservative than §50.46 (a)(1)(i) models, and a licensee wishing to realize the full benefits of the new rule could voluntarily develop and apply these §50.46 (a)(1)(i) models.

The staff therefore asks, does the Commission intend that a licensee use "realistic" models (conforming with §50.46(a)(1)(i)) for the entire spectrum of breaks, regardless of whether affected by changes resulting from the redefinition; that the models be used only for the larger breaks, for purposes of showing compliance with §50.46 after implementation of changes; or some other purpose?

GUIDANCE AREA 4: Redefinition Applicability to Future Plants

The staff seeks policy guidance concerning consideration of LOCA redefinition for future plants as part of efforts separate from this rulemaking.

With respect to future plants, the SRM included two statements, one pertaining to use of best-estimate models (see above), and the other stating "the staff should maintain similar margins in future plant design certifications, even if we ultimately adopt a revised LBLOCA definition."

The staff believes that LOCA redefinition for future plants should be pursued on a separate path from rulemaking for existing designs. The staff envisions that a redefinition rule would cover two areas, first being how a new maximum design basis LOCA break size is determined, and second being what can be done with respect to changes in design and/or operation. For a plant that has not yet been designed or constructed, it may be preferable to apply criteria to the design as a whole. The question of LOCA redefinition also ties into broader considerations about what design basis events should be for future reactors.

The staff therefore asks, does the Commission intend that design basis event for future plants be pursued on a separate path?